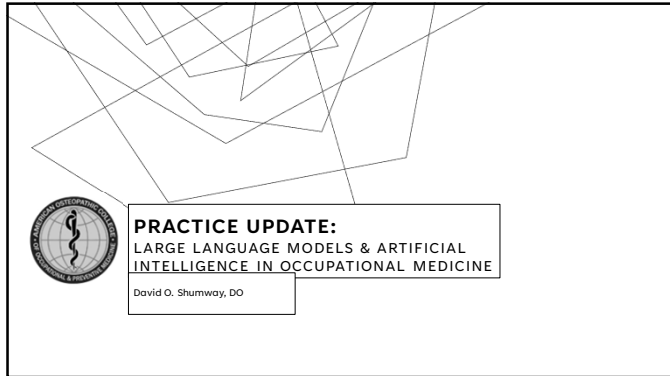
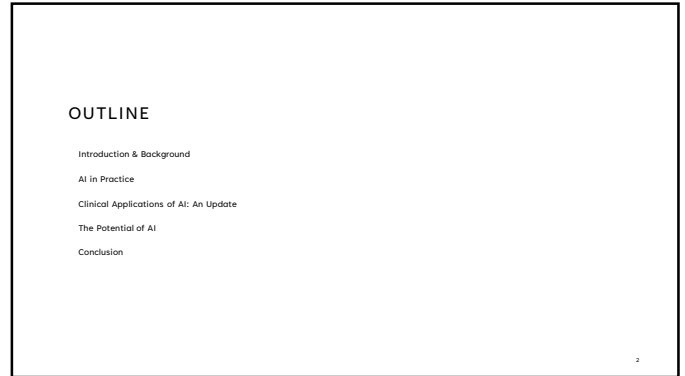




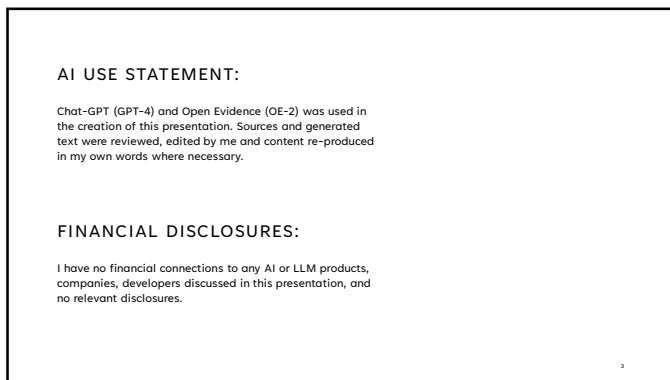
# The American Osteopathic College of Occupational and Preventive Medicine 2024 Midyear Educational Conference



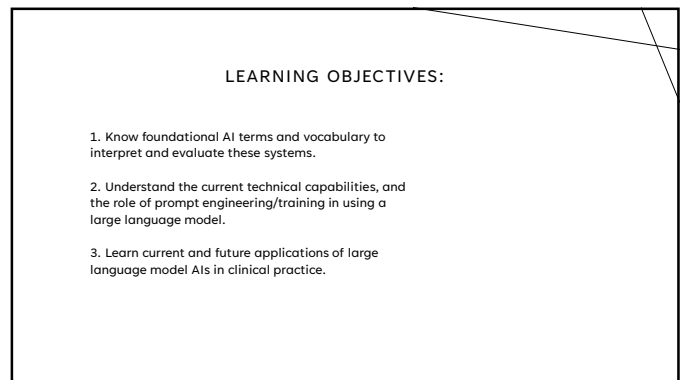
1



2



3



4



5



6



# The American Osteopathic College of Occupational and Preventive Medicine 2024 Midyear Educational Conference

## WHY THIS MATTERS:

- Artificial Intelligence (AI) is already rapidly changing healthcare as we know it forever.
- AI is clinically relevant to you. If not now, it soon will be.

7

## INTRODUCTION & BACKGROUND

8

## BACKGROUND: WHAT IS AI?

Artificial Intelligence = simulation of human intelligence in machines  
Allows them to perform tasks that typically require human-like cognitive functions  
Can learn, reason, problem-solve, perceive, understand and produce language.

9

## BACKGROUND: A HISTORY OF CLINICAL AI

Use in EHR (1970-1990's)  
MYCIN – computerized infectious disease consultation system (1977)  
Decision support & drug interaction warnings  
Quality metric tracking, billing and coding support  
Use in Imaging/Radiology (1990's)  
Basic CAD applications/measurements (1990's)  
Deep learning/CNN for pathology recognition (2008-2010)  
Use in Echocardiography (2010's)  
Improved image acquisition/measurements, higher diagnostic accuracy  
Use in Endoscopy (2010's)  
Automatic polyp detection improved performance over human endoscopist (2022)

10

## BACKGROUND: AI TERMINOLOGY

### Narrow vs General AI

**Narrow AI:** current/historical technology; designed to perform specific tasks

**General AI:** emerging/future technology; human-like intelligence that can learn, interpret, and apply knowledge to any domain.

### Machine Learning

**Deep Learning:** utilizes neural networks to analyze and learn from large amounts of data, often without explicit human understanding ("Black Box").

**Reinforcement Learning:** utilizes human influence to guide AI development by using rewards or penalties based on its performance.

11

## BACKGROUND: AI TERMINOLOGY

### Natural Language Processing (NLP)

The process of a computer reading, understanding, and interpreting human language.  
Also involves translation and production of language.

### Optical Character Recognition (OCR)

Involves the detection and recognition of printed or handwritten characters  
Converts photos, scanned images, and un-editable formats into editable and searchable text that can be accessed by a word processor.

### Ambient Dictation

Emerging application of LLM NLP in healthcare and legal settings; "AI Scribe"  
Pairs voice recognition with NLP and generative AI functionality.

### Prompt

The way a user inputs, queries, or communicates with a LLM AI.

12



# The American Osteopathic College of Occupational and Preventive Medicine 2024 Midyear Educational Conference

## BACKGROUND: WHAT IS A LLM?

Artificial Intelligence models based on neural networks designed to understand, generate, and manipulate human-like language.  
Trained on vast amounts of data.  
Complexity and capabilities of an LLM is directly related to size.  
Number of "weights" (training parameters)  
Amount of training data  
Indistinguishable from humans in recent studies

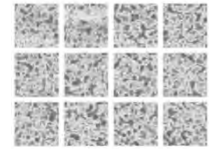


13

## BACKGROUND: HOW DO YOU TRAIN A LLM?

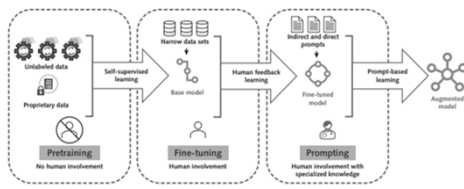
The best thing about AI is its ability to

learn	4.5%
predict	3.5%
make	3.2%
understand	3.1%
do	2.9%



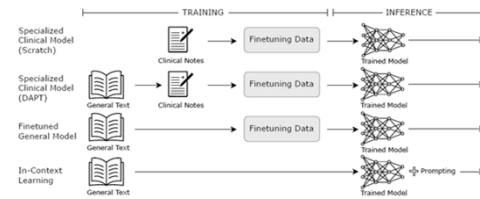
14

## BACKGROUND: HOW DO YOU TRAIN A LLM?



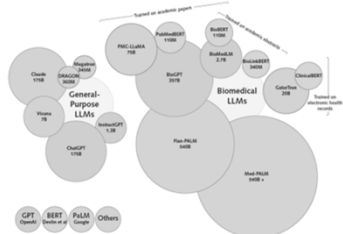
15

## BACKGROUND: HOW DO YOU TRAIN A LLM?



16

## BACKGROUND: AI IN MEDICINE TODAY



17

## BACKGROUND: AI IN MEDICINE TODAY

**GPT-Lineage LLMs:**  
Powerful, prevalent, most familiar  
Trainable on specific data sets

**PaLM-Lineage LLMs:**  
Google-developed  
Largest LLM by number of weights  
Fine-tunable for clinical applications

**Bi-directional Encoder (BERT):**  
Non-generative; contextual word embedding model  
Used in NLP applications

18



# The American Osteopathic College of Occupational and Preventive Medicine 2024 Midyear Educational Conference

## AI IN PRACTICE

19

## A MODEL LLM: CHAT-GPT (GPT-4)

**"Chat Generative Pre-Trained Transformer"**  
Developed by San Francisco based-Open AI on Microsoft Azure, Nvidia GPUs  
Free and Paid (Plus \$20 per month) tiers

### Features:

- Can process code, pictures, files/PDFs (4)
- **Browses the internet (4)**
- API and Plug-In integration (4)
- **App store**
- iPhone app
- Whisper



20

## THE DOD'S LLM: ASK SAGE

### "Ask SAGE"

Approved on DOD computers (CUI)  
CAC-enabled

### Features:

- API access to multiple LLMs (GPT, Bard)
- Built-in prompt engineering (role, task)
- Non-functional without the paid tier (\$25-30 per month)
- No Whisper



21

## THE DOD'S LLM: ASK SAGE



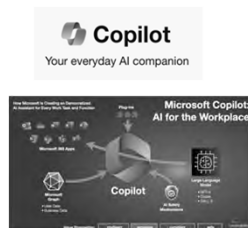
22

## A POWERFUL NEWCOMER: MICROSOFT COPILOT

**Works with/directly embedded in Office 365**  
Free and Paid (Pro \$20 per month) tiers

### Features:

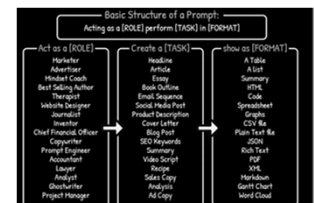
Same features and capabilities of GPT  
Utilize existing LLMs (GPT/DALLE) with greater data security and higher integration  
Backed by the integrity and credibility of Microsoft  
Enterprise ready



23

## UNDERSTANDING PROMPTS:

"Prompts" are the command entries that make an LLM work.  
"Prompt Engineering" is an art that is rapidly becoming a science.  
Poor prompting = poor result



24



# The American Osteopathic College of Occupational and Preventive Medicine 2024 Midyear Educational Conference

## UNDERSTANDING PROMPTS: MODIFIERS

Special prompts which modify LLM's behavior/personality:  
"Tone Modifiers" affect the output  
The most powerful modifier is the "Motivation" or "Role" modifier.

Motivation/Role Setting:

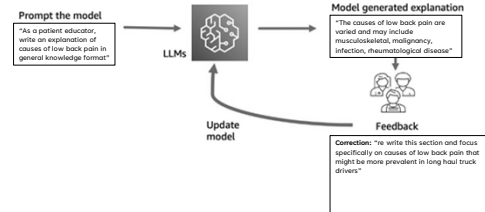
"Pretend you are a ..."

CHATGPT TONE MODIFIERS			
Tone Modifier	Example Prompt	Effect	Result
Formal	Write a formal letter to the principal.	Increases formality and professionalism.	A formal letter to the principal.
Informal	Write an informal letter to a friend.	Decreases formality and professionalism.	An informal letter to a friend.
Professional	Write a professional email to a colleague.	Increases professionalism and formality.	A professional email to a colleague.
Unprofessional	Write an unprofessional email to a colleague.	Decreases professionalism and formality.	An unprofessional email to a colleague.
Polite	Write a polite letter to the principal.	Increases politeness and courtesy.	A polite letter to the principal.
Impolite	Write an impolite letter to the principal.	Decreases politeness and courtesy.	An impolite letter to the principal.
Helpful	Write a helpful letter to the principal.	Increases helpfulness and assistance.	A helpful letter to the principal.
Unhelpful	Write an unhelpful letter to the principal.	Decreases helpfulness and assistance.	An unhelpful letter to the principal.
Friendly	Write a friendly letter to the principal.	Increases friendliness and warmth.	A friendly letter to the principal.
Unfriendly	Write an unfriendly letter to the principal.	Decreases friendliness and warmth.	An unfriendly letter to the principal.
Enthusiastic	Write an enthusiastic letter to the principal.	Increases enthusiasm and energy.	An enthusiastic letter to the principal.
Disenthusiastic	Write a disenchanted letter to the principal.	Decreases enthusiasm and energy.	A disenchanted letter to the principal.
Optimistic	Write an optimistic letter to the principal.	Increases optimism and positivity.	An optimistic letter to the principal.
Pessimistic	Write a pessimistic letter to the principal.	Decreases optimism and positivity.	A pessimistic letter to the principal.
Confident	Write a confident letter to the principal.	Increases confidence and assertiveness.	A confident letter to the principal.
Insecure	Write an insecure letter to the principal.	Decreases confidence and assertiveness.	An insecure letter to the principal.
Assertive	Write an assertive letter to the principal.	Increases assertiveness and confidence.	An assertive letter to the principal.
Passive	Write a passive letter to the principal.	Decreases assertiveness and confidence.	A passive letter to the principal.
Aggressive	Write an aggressive letter to the principal.	Increases aggression and hostility.	An aggressive letter to the principal.
Non-aggressive	Write a non-aggressive letter to the principal.	Decreases aggression and hostility.	A non-aggressive letter to the principal.
Humorous	Write a humorous letter to the principal.	Increases humor and lightheartedness.	A humorous letter to the principal.
Serious	Write a serious letter to the principal.	Decreases humor and lightheartedness.	A serious letter to the principal.
Witty	Write a witty letter to the principal.	Increases wit and cleverness.	A witty letter to the principal.
Awkward	Write an awkward letter to the principal.	Decreases wit and cleverness.	An awkward letter to the principal.
Concise	Write a concise letter to the principal.	Increases brevity and conciseness.	A concise letter to the principal.
Verbose	Write a verbose letter to the principal.	Decreases brevity and conciseness.	A verbose letter to the principal.
Direct	Write a direct letter to the principal.	Increases directness and clarity.	A direct letter to the principal.
Indirect	Write an indirect letter to the principal.	Decreases directness and clarity.	An indirect letter to the principal.
Clear	Write a clear letter to the principal.	Increases clarity and understanding.	A clear letter to the principal.
Unclear	Write an unclear letter to the principal.	Decreases clarity and understanding.	An unclear letter to the principal.
Simple	Write a simple letter to the principal.	Increases simplicity and ease of understanding.	A simple letter to the principal.
Complex	Write a complex letter to the principal.	Decreases simplicity and ease of understanding.	A complex letter to the principal.
Easy to read	Write an easy to read letter to the principal.	Increases readability and ease of understanding.	An easy to read letter to the principal.
Hard to read	Write a hard to read letter to the principal.	Decreases readability and ease of understanding.	A hard to read letter to the principal.
Engaging	Write an engaging letter to the principal.	Increases engagement and interest.	An engaging letter to the principal.
Boring	Write a boring letter to the principal.	Decreases engagement and interest.	A boring letter to the principal.
Interesting	Write an interesting letter to the principal.	Increases interest and curiosity.	An interesting letter to the principal.
Boring	Write a boring letter to the principal.	Decreases interest and curiosity.	A boring letter to the principal.
Informative	Write an informative letter to the principal.	Increases informativeness and knowledge.	An informative letter to the principal.
Uninformative	Write an uninformative letter to the principal.	Decreases informativeness and knowledge.	An uninformative letter to the principal.
Useful	Write a useful letter to the principal.	Increases usefulness and practicality.	A useful letter to the principal.
Unuseful	Write an unuseful letter to the principal.	Decreases usefulness and practicality.	An unuseful letter to the principal.
Helpful	Write a helpful letter to the principal.	Increases helpfulness and assistance.	A helpful letter to the principal.
Unhelpful	Write an unhelpful letter to the principal.	Decreases helpfulness and assistance.	An unhelpful letter to the principal.
Supportive	Write a supportive letter to the principal.	Increases supportiveness and encouragement.	A supportive letter to the principal.
Unsupportive	Write an unsupportive letter to the principal.	Decreases supportiveness and encouragement.	An unsupportive letter to the principal.
Encouraging	Write an encouraging letter to the principal.	Increases encouragement and motivation.	An encouraging letter to the principal.
Discouraging	Write a discouraging letter to the principal.	Decreases encouragement and motivation.	A discouraging letter to the principal.
Positive	Write a positive letter to the principal.	Increases positivity and optimism.	A positive letter to the principal.
Negative	Write a negative letter to the principal.	Decreases positivity and optimism.	A negative letter to the principal.
Optimistic	Write an optimistic letter to the principal.	Increases optimism and positivity.	An optimistic letter to the principal.
Pessimistic	Write a pessimistic letter to the principal.	Decreases optimism and positivity.	A pessimistic letter to the principal.
Hopeful	Write a hopeful letter to the principal.	Increases hope and positivity.	A hopeful letter to the principal.
Unhopeful	Write an unhelpful letter to the principal.	Decreases hope and positivity.	An unhelpful letter to the principal.
Confident	Write a confident letter to the principal.	Increases confidence and assertiveness.	A confident letter to the principal.
Insecure	Write an insecure letter to the principal.	Decreases confidence and assertiveness.	An insecure letter to the principal.
Assertive	Write an assertive letter to the principal.	Increases assertiveness and confidence.	An assertive letter to the principal.
Passive	Write a passive letter to the principal.	Decreases assertiveness and confidence.	A passive letter to the principal.
Aggressive	Write an aggressive letter to the principal.	Increases aggression and hostility.	An aggressive letter to the principal.
Non-aggressive	Write a non-aggressive letter to the principal.	Decreases aggression and hostility.	A non-aggressive letter to the principal.
Humorous	Write a humorous letter to the principal.	Increases humor and lightheartedness.	A humorous letter to the principal.
Serious	Write a serious letter to the principal.	Decreases humor and lightheartedness.	A serious letter to the principal.
Witty	Write a witty letter to the principal.	Increases wit and cleverness.	A witty letter to the principal.
Awkward	Write an awkward letter to the principal.	Decreases wit and cleverness.	An awkward letter to the principal.
Concise	Write a concise letter to the principal.	Increases brevity and conciseness.	A concise letter to the principal.
Verbose	Write a verbose letter to the principal.	Decreases brevity and conciseness.	A verbose letter to the principal.
Direct	Write a direct letter to the principal.	Increases directness and clarity.	A direct letter to the principal.
Indirect	Write an indirect letter to the principal.	Decreases directness and clarity.	An indirect letter to the principal.
Clear	Write a clear letter to the principal.	Increases clarity and understanding.	A clear letter to the principal.
Unclear	Write an unclear letter to the principal.	Decreases clarity and understanding.	An unclear letter to the principal.
Simple	Write a simple letter to the principal.	Increases simplicity and ease of understanding.	A simple letter to the principal.
Complex	Write a complex letter to the principal.	Decreases simplicity and ease of understanding.	A complex letter to the principal.
Easy to read	Write an easy to read letter to the principal.	Increases readability and ease of understanding.	An easy to read letter to the principal.
Hard to read	Write a hard to read letter to the principal.	Decreases readability and ease of understanding.	A hard to read letter to the principal.
Engaging	Write an engaging letter to the principal.	Increases engagement and interest.	An engaging letter to the principal.
Boring	Write a boring letter to the principal.	Decreases engagement and interest.	A boring letter to the principal.
Interesting	Write an interesting letter to the principal.	Increases interest and curiosity.	An interesting letter to the principal.
Boring	Write a boring letter to the principal.	Decreases interest and curiosity.	A boring letter to the principal.
Informative	Write an informative letter to the principal.	Increases informativeness and knowledge.	An informative letter to the principal.
Uninformative	Write an uninformative letter to the principal.	Decreases informativeness and knowledge.	An uninformative letter to the principal.
Useful	Write a useful letter to the principal.	Increases usefulness and practicality.	A useful letter to the principal.
Unuseful	Write an unuseful letter to the principal.	Decreases usefulness and practicality.	An unuseful letter to the principal.
Helpful	Write a helpful letter to the principal.	Increases helpfulness and assistance.	A helpful letter to the principal.
Unhelpful	Write an unhelpful letter to the principal.	Decreases helpfulness and assistance.	An unhelpful letter to the principal.
Supportive	Write a supportive letter to the principal.	Increases supportiveness and encouragement.	A supportive letter to the principal.
Unsupportive	Write an unsupportive letter to the principal.	Decreases supportiveness and encouragement.	An unsupportive letter to the principal.
Encouraging	Write an encouraging letter to the principal.	Increases encouragement and motivation.	An encouraging letter to the principal.
Discouraging	Write a discouraging letter to the principal.	Decreases encouragement and motivation.	A discouraging letter to the principal.
Positive	Write a positive letter to the principal.	Increases positivity and optimism.	A positive letter to the principal.
Negative	Write a negative letter to the principal.	Decreases positivity and optimism.	A negative letter to the principal.
Optimistic	Write an optimistic letter to the principal.	Increases optimism and positivity.	An optimistic letter to the principal.
Pessimistic	Write a pessimistic letter to the principal.	Decreases optimism and positivity.	A pessimistic letter to the principal.
Hopeful	Write a hopeful letter to the principal.	Increases hope and positivity.	A hopeful letter to the principal.
Unhopeful	Write an unhelpful letter to the principal.	Decreases hope and positivity.	An unhelpful letter to the principal.

## PRACTICE EXERCISE: PROMPT ENGINEERING

Practice creating a prompt in the RTF format.

## REFINING LLM OUTPUT: FEEDBACK



## CLINICAL APPLICATIONS OF AI: AN UPDATE

## CLINICAL APPLICATIONS: AI IN MEDICINE TODAY

### Practice Workflow:

- Medical Scribe
- Diagnostic Assistant
- Chart Reviewer
- Point of Care Decision Resource
- Creating patient resources

### Administrative:

- Scanned medical record processing
- Patient correspondence
- Scheduling
- Billing and compliance

### Medical Education:

- Question/Item Writing
- Exam Analysis/Grading
- Personal Tutor
- Flashcard/material production

### Research:

- Literature review
- Document drafting
- Data analysis



# The American Osteopathic College of Occupational and Preventive Medicine 2024 Midyear Educational Conference

## CLINICAL APPLICATIONS: AI IN OM/PM/AM

### "Fitness for Duty" Evaluations & Screening Exams

- Process questionnaires
- Simplify documentation
- Clinical reasoning can assist determination

### DOT MRB Guidelines for CMEs

- MRB summaries that offer guidelines for CMEs but they aren't always easy to locate or review.

- AI helpful in highlighting pertinent guidelines in order to assist the CME

### FAA Exam AME Guide

- AME guide is about 600 pages long.
- A.I. could provide the AME with exactly the needed references

31

## CLINICAL APPLICATIONS: POC DECISION SUPPORT

- Improved clinical diagnostic accuracy
- Better utilization of existing resources
- Controlled data/knowledge base
- A curbside consult in your pocket!

### Recover-X

- For-profit, backed by AMA's Health 2047.
- Curated and maintained by physician experts
- (Allowing some physicians tester licenses)

### Clinical Key

- Elsevier-backed, affiliated with Open Evidence
- (Currently in Beta)

### Glass.ai

- Maintained by physicians
- Built on Chat GT

### Open Evidence

- Non-profit, free to physicians (requires NPI)
- Only peer-reviewed studies and guidelines.

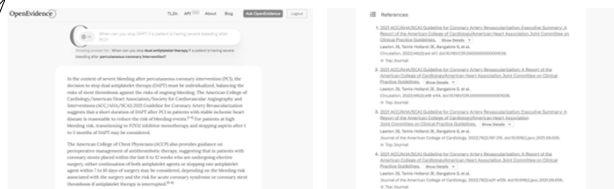


ClinicalKey



32

## CLINICAL APPLICATIONS: EVIDENCE BASED MEDICINE



33

## CLINICAL APPLICATIONS: MEDICAL SCRIBE

- Generative AI has the ability to both produce and analyze text through **natural language processing (NLP)**.

- Trainable to your note writing style.
- When paired with an AI transcription tool (like Whisper), Chat GTP can become a fully autonomous medical scribe.
- With file upload, can reference prior medical records/notes.

male Date: [Insert Date]

Subjective:

Chief Complaint: Dyspepsia

History of Present Illness: Complaints of a 6-month history of recurrent dyspepsia; sensation of upper abdominal fullness post meals, occasionally with burning sensation. Symptoms are exacerbated by heavy meals. Denies associated nausea, vomiting, weight loss, appetite changes, or altered bowel habits. OTC antacids provide no relief.

Past Medical History: Hypertension on amlodipine.

Message

34

## CLINICAL APPLICATIONS: MEDICAL SCRIBE

- Ambient dictation, automated note writing and visit documentation.
- Many are EMR embedded, bill and code notes

### Deep Scribe

- Customizable ambient dictation
- Published, transparent data security

### Amazon Web Services

### Nuance (Dragon) DAX Copilot

- Industry Leader, proven technology and track record
- Epic embedded
- Expensive (\$\$\$)?

### Nabla Copilot

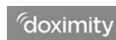
- Free and Paid (\$119) versions
- Use in browser and mobile app

### Doximity

- No ambient transcription
- Generative only
- HIPAA compliant



Nabla Copilot



35

## CLINICAL APPLICATIONS: SCANNED DOC PROCESSING

- Can review PDF documents, Excel files, scanned images.

- Upload directly or access via share link

### Optical character recognition (OCR)

- Analyze and document your handwritten or submitted questionnaires
- Simplifies medical record review and conversion of handwritten records



36



# The American Osteopathic College of Occupational and Preventive Medicine 2024 Midyear Educational Conference

## CLINICAL APPLICATIONS: SCANNED DOC PROCESSING

Can review PDF documents, Excel files, scanned images.  
**Optical character recognition (OCR)**  
Analyze and document your handwritten or submitted questionnaires  
Simplifies medical record review and conversion of handwritten records

37

## CLINICAL APPLICATIONS: DOC & RECORD REVIEW

AI powered, automated record review.  
Scanned documents = OCR  
Context and review = NLP

DigitalOwl

Wisedocs

Epic

**Digital Owl**  
Context-recognition  
Advanced NLP  
**Wise Docs**  
Intelligent OCR  
Automatic page de-duplication  
Clinical insights  
**EMR Embedded**  
AI embedded in the EMR can simplify medical record review  
Real-time review and utilization

38

## THE POTENTIAL OF AI

39

## FUTURE & POTENTIAL APPLICATIONS OF AI:

**Full Scope Medical Practice:**  
Diagnosis, management, and documentation at the level of a medical resident or mid-level.  
**Full Scope Personal Assistant:**  
Clinic manager, scheduler, human resources, biller/coder all rolled into one. Correspond and triage patient messages.  
**Pocket Curbside/Scalable Privilege:**  
Act with the aggregated expertise of tertiary level experts on demand. Verified, vetted, standard of care. Extends tertiary capabilities to under-served/rural areas.

**Remote Patient Monitoring:**  
Manage certain patients to an inpatient standard in an outpatient or home setting.  
**Live Video Analysis:**  
Current gen AI are capable of watching and understanding video footage. Possibility of standardized real-time assessment.

40

## FUTURE & POTENTIAL APPLICATIONS OF AI:

**Full Scope Medical Practice:**  
Diagnosis, management, and documentation at the level of a medical resident or mid-level.  
**Full Scope Personal Assistant:**  
Clinic manager, scheduler, human resources, biller/coder all rolled into one. Correspond and triage patient messages.  
**Pocket Curbside/Scalable Privilege:**  
Act with the aggregated expertise of tertiary level experts on demand. Verified, vetted, standard of care. Extends tertiary capabilities to under-served/rural areas.

**Remote Patient Monitoring:**  
Manage certain patients to an inpatient standard in an outpatient or home setting.  
**Live Video Analysis:**  
Current gen AI are capable of watching and understanding video footage. Possibility of standardized real-time assessment.

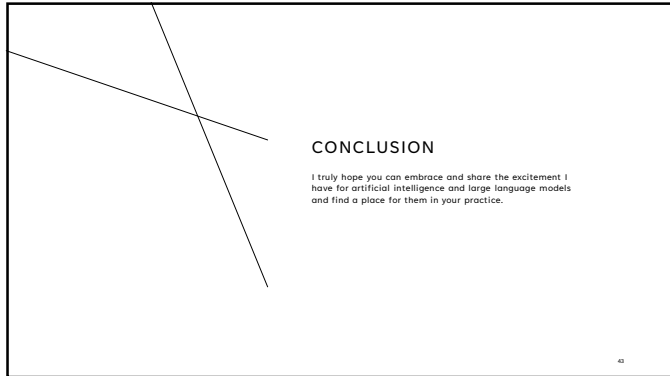
41

## CONCLUSION

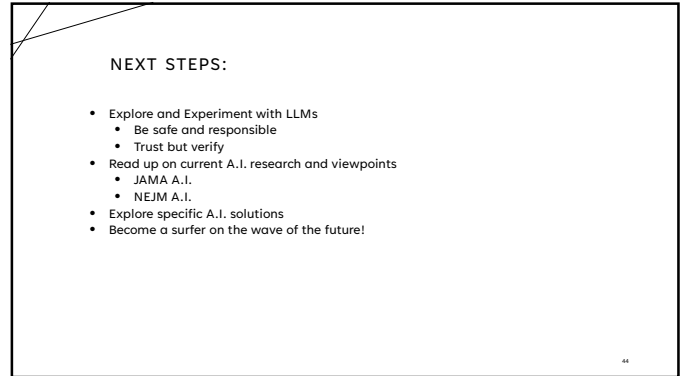
42



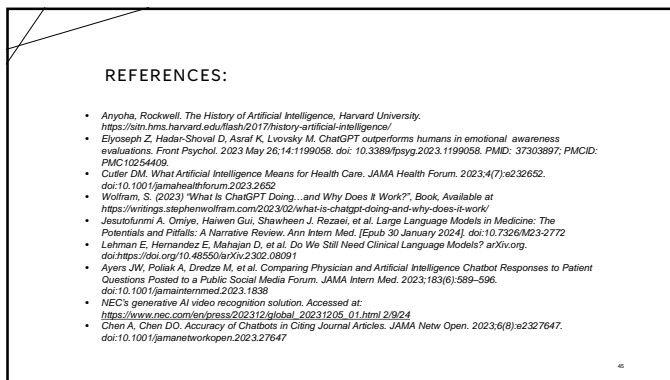
# The American Osteopathic College of Occupational and Preventive Medicine 2024 Midyear Educational Conference



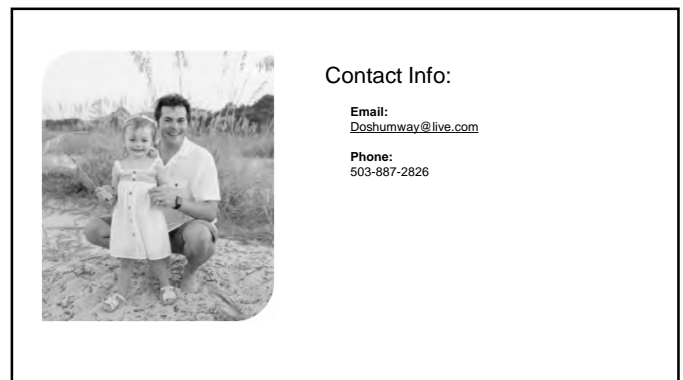
43



44



45



46



47